

BLAST Basic Local Alignment Search Tool

Job Title: icl|31840 (21 letters) USSN 10/738,413

EXHIBIT 5

- Your search parameters were adjusted to search for a short input sequence.

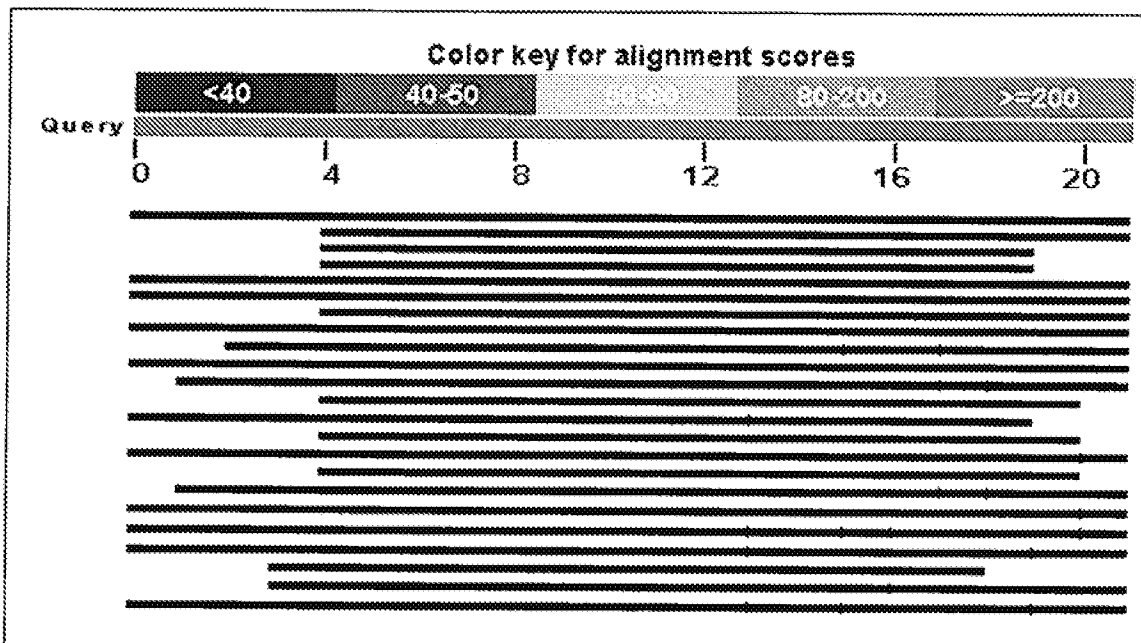
[Please, try our new design!](#)**BLASTN 2.2.18+**

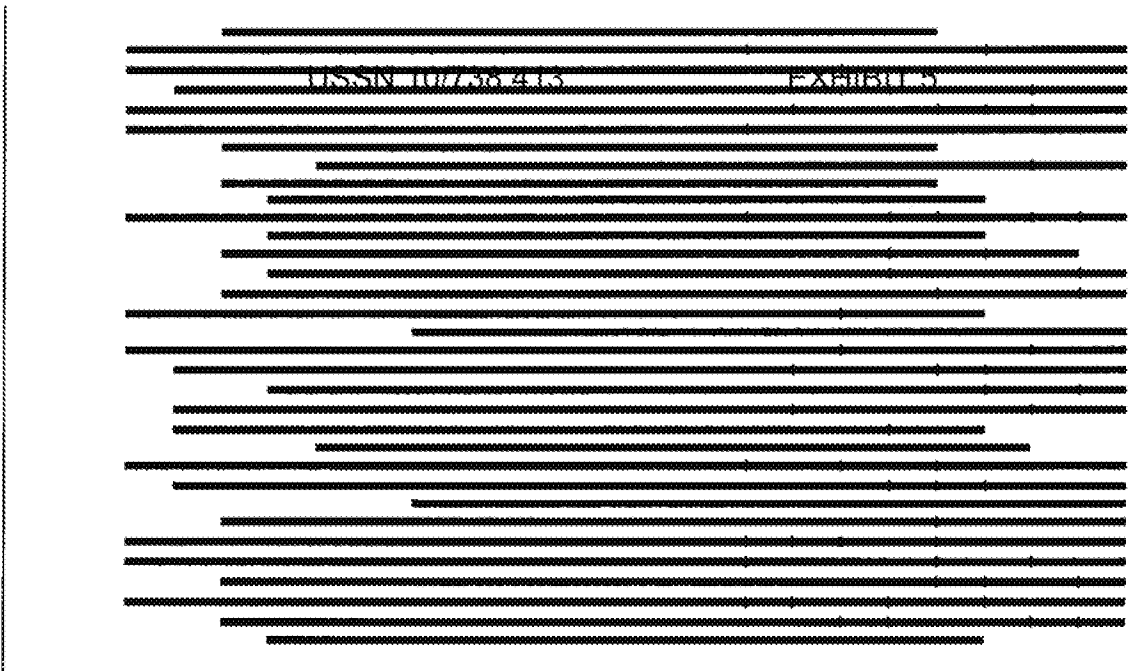
Reference: Stephen F. Altschul, Thomas L. Madden, Alejandro A. Schäffer, Jinghui Zhang, Zheng Zhang, Webb Miller, and David J. Lipman (1997), "Gapped BLAST and PSI-BLAST: a new generation of protein database search programs", Nucleic Acids Res. 25:3389-3402. RID: 9H5H90R0015 Database: human build 36.3 reference assembly genomic scaffolds 49,942 sequences; 5,818,011,736 total letters

[Genome View](#)

Show positions of the BLAST hits in the human genome using the Entrez Genomes MapViewer

Query= Length=21






[Designing or Testing PCR Primers? Try your s](#)**Distribution of 654 Blast Hits on the Query Sequence**



Display tree of results NEW

















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Legend for links to other resources:  UniGene  GEO  Gene  Structure  Map**Sequences producing significant alignments:**

(Click headers to sort columns)

Transcripts

gi 113722118 NM_000372.4	Homo sapiens tyrosinase (oculocutaneous albinism IA) (TYR), mRNA	42.1	42.1	100%	0.005	100%	   
gi 32313592 NM_006418.3	Homo sapiens olfactomedin 4 (OLFM4), mRNA	34.2	34.2	80%	1.2	100%	   
gi 149363684 NM_015325.1	Homo sapiens KIAA0947 protein (KIAA0947), mRNA	30.2	30.2	71%	19	100%	   
gi 142386366 NM_138392.2	Homo sapiens SH3KBP1 binding protein 1 (SH3KBP1), mRNA	30.2	30.2	71%	19	100%	   

Genomic sequences [show first]

gi 157812179 NW_001838029.2	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279185367)	42.1	42.1	100%	0.005	100%	
gi 51470779 NT_008984.17	Homo sapiens chromosome 11 genomic contig, reference assembly	42.1	42.1	100%	0.005	100%	
gi 157812202 NW_001838080.2	Homo sapiens chromosome 13 genomic contig, alternate assembly (based on HuRef SCAF_1103279180250)	34.2	62.4	80%	1.2	100%	
gi 157697950 NW_001842360.1	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279188416)	34.2	222	100%	1.2	100%	
gi 37546841 NT_024524.13	Homo sapiens chromosome 13 genomic contig, reference assembly	34.2	413	90%	1.2	100%	
gi 89059526 NT_011757.15	Homo sapiens chromosome X genomic contig, reference assembly	34.2	276	100%	1.2	100%	
gi 157696942 NW_001838065.1	Homo sapiens chromosome 12 genomic contig, alternate assembly (based on HuRef SCAF_1103279188103)	32.2	84.7	95%	4.7	100%	
gi 157811946 NW_001838849.2	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279188271)	32.2	58.5	76%	4.7	100%	
gi 157697620 NW_001838401.1	Homo sapiens chromosome 16 genomic contig, alternate assembly (based on HuRef SCAF_1103279187672)	32.2	58.5	90%	4.7	100%	
gi 157696568 NW_001839007.1	Homo sapiens chromosome 7 genomic contig, alternate assembly (based on HuRef SCAF_1103279185597)	32.2	58.5	76%	4.7	100%	
gi 157696481 NW_001838920.1	Homo sapiens chromosome 4	32.2	84.7	100%	4.7	100%	

genomic contig, alternate
assembly (based on HuRef
US9140738.41833)

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gi 37538184 NT_033968.5	Homo sapiens chromosome 7 genomic contig, reference assembly	32.2	58.5	76%	4.7	100%
gi 89035805 NT_009755.18	Homo sapiens chromosome 12 genomic contig, reference assembly	32.2	252	95%	4.7	100%
gi 88977422 NT_016354.18	Homo sapiens chromosome 4 genomic contig, reference assembly	32.2	403	100%	4.7	100%
gi 88953723 NT_022135.15	Homo sapiens chromosome 2 genomic contig, reference assembly	32.2	220	100%	4.7	100%
gi 51472974 NT_010393.15	Homo sapiens chromosome 16 genomic contig, reference assembly	32.2	428	100%	4.7	100%
gi 157812194 NW_001838066.2	Homo sapiens chromosome 12 genomic contig, alternate assembly (based on HuRef SCAF_1103279188213)	30.2	30.2	71%	19	100%
gi 157812193 NW_001838064.2	Homo sapiens chromosome 12 genomic contig, alternate assembly (based on HuRef SCAF_1103279188390)	30.2	111	85%	19	100%
gi 157812275 NW_001838218.2	Homo sapiens chromosome 15 genomic contig, alternate assembly (based on HuRef SCAF_1103279188258)	30.2	351	100%	19	100%
gi 157812414 NW_001838483.2	Homo sapiens chromosome 19 genomic contig, alternate assembly (based on HuRef SCAF_1103279188176)	30.2	30.2	71%	19	100%
gi 157812175 NW_001838022.2	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279188392)	30.2	399	100%	19	100%
gi 157697854 NW_001838666.1	Homo sapiens chromosome 20 genomic contig, alternate assembly (based on HuRef SCAF_1103279188360)	30.2	58.5	100%	19	100%
gi 157811963 NW_001838884.2	Homo sapiens chromosome 3 genomic contig, alternate assembly (based on HuRef SCAF_1103279188385)	30.2	508	95%	19	100%
gi 157697894 NW_001838706.1	Homo sapiens chromosome 21 genomic contig, alternate assembly (based on HuRef SCAF_1103279188379)	30.2	244	100%	19	100%
gi 157811817 NW_001838533.2	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188157)	30.2	375	100%	19	100%
gi 157812405 NW_001838466.2	Homo sapiens chromosome 18 genomic contig, alternate assembly (based on HuRef SCAF_1103279188324)	30.2	30.2	71%	19	100%
gi 157812170 NW_001838005.2	Homo sapiens chromosome 10 genomic contig, alternate assembly (based on HuRef	30.2	56.5	80%	19	100%

SCAF_1103279188123)

gi 157697891 NW_001838703.1	Homo sapiens chromosome 21 genomic contig, alternate assembly (based on HuRef SCAF_1103279188184)	30.2	30.2	71%	19	100%
gi 157696803 NW_001839242.1	Homo sapiens chromosome 9 genomic contig, alternate assembly (based on HuRef SCAF_1103279188125)	30.2	30.2	71%	19	100%
gi 157697933 NW_001838745.1	Homo sapiens chromosome 22 genomic contig, alternate assembly (based on HuRef SCAF_1103279188372)	30.2	325	100%	19	100%
gi 157812071 NW_001839109.2	Homo sapiens chromosome 8 genomic contig, alternate assembly (based on HuRef SCAF_1103279182719)	30.2	30.2	71%	19	100%
gi 157812219 NW_001838113.2	Homo sapiens chromosome 14 genomic contig, alternate assembly (based on HuRef SCAF_1103279188183)	30.2	139	85%	19	100%
gi 157811769 NW_001838589.2	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188310)	30.2	161	85%	19	100%
gi 157696564 NW_001839003.1	Homo sapiens chromosome 7 genomic contig, alternate assembly (based on HuRef SCAF_1103279188377)	30.2	294	90%	19	100%
gi 157697730 NW_001838329.1	Homo sapiens chromosome 16 genomic contig, alternate assembly (based on HuRef SCAF_1103279188231)	30.2	82.8	85%	19	100%
gi 157696323 NW_001838762.1	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279187945)	30.2	30.2	71%	19	100%
gi 157812368 NW_001838328.2	Homo sapiens chromosome 15 genomic contig, alternate assembly (based on HuRef SCAF_1103279187671)	30.2	167	100%	19	100%
gi 157811893 NW_001838818.2	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279188423)	30.2	222	95%	19	100%
gi 157812178 NW_001838028.2	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279187758)	30.2	82.8	85%	19	100%
gi 157696534 NW_001838973.1	Homo sapiens chromosome 6 genomic contig, alternate assembly (based on HuRef SCAF_1103279188126)	30.2	193	95%	19	100%
gi 157696439 NW_001838878.1	Homo sapiens chromosome 3 genomic contig, alternate assembly (based on HuRef SCAF_1103279188187)	30.2	56.5	80%	19	100%
gi 157696487 NW_001838926.1	Homo sapiens chromosome 5 genomic contig, alternate assembly (based on HuRef SCAF_1103279187504)	30.2	30.2	71%	19	100%
gi 157811959 NW_001838877.2		30.2	399	100%	19	100%

Homo sapiens chromosome 3
genomic contig, alternate
assembly (based on HuRef
SCAF_1103279188143)

EXHIBIT 5

gi 157697822 NW_001838484.1	Homo sapiens chromosome 19 genomic contig, alternate assembly (based on HuRef SCAF_1103279188355)	30.2	214	95%	19	100%
gi 157696988 NW_001838110.1	Homo sapiens chromosome 14 genomic contig, alternate assembly (based on HuRef SCAF_1103279188393A)	30.2	82.8	71%	19	100%
gi 157696904 NW_001838027.1	Homo sapiens chromosome 11 genomic contig, alternate assembly (based on HuRef SCAF_1103279184614)	30.2	56.5	90%	19	100%
gi 51464027 NT_022517.17	Homo sapiens chromosome 3 genomic contig, reference assembly	30.2	480	100%	19	100%
gi 51465675 NT_007592.14	Homo sapiens chromosome 6 genomic contig, reference assembly	30.2	434	100%	19	100%
gi 51468880 NT_033927.7	Homo sapiens chromosome 11 genomic contig, reference assembly	30.2	112	90%	19	100%
gi 51493278 NT_026437.11	Homo sapiens chromosome 14 genomic contig, reference assembly	30.2	327	100%	19	100%
gi 51464897 NT_006576.15	Homo sapiens chromosome 5 genomic contig, reference assembly	30.2	351	90%	19	100%
gi 51467290 NT_035014.4	Homo sapiens chromosome 9 genomic contig, reference assembly	30.2	30.2	71%	19	100%
gi 88953465 NT_022171.14	Homo sapiens chromosome 2 genomic contig, reference assembly	30.2	222	95%	19	100%
gi 89061340 NT_011903.12	Homo sapiens chromosome Y genomic contig, reference assembly	30.2	135	85%	19	100%
gi 88966845 NT_005612.15	Homo sapiens chromosome 3 genomic contig, reference assembly	30.2	658	100%	19	100%
gi 51463895 NT_022459.14	Homo sapiens chromosome 3 genomic contig, reference assembly	30.2	84.7	80%	19	100%
gi 29801560 NT_011295.10	Homo sapiens chromosome 19 genomic contig, reference assembly	30.2	244	95%	19	100%
gi 51473102 NT_010498.15	Homo sapiens chromosome 16 genomic contig, reference assembly	30.2	432	100%	19	100%
gi 88943682 NT_004487.18	Homo sapiens chromosome 1 genomic contig, reference assembly	30.2	454	100%	19	100%
gi 37552484 NT_023736.16	Homo sapiens chromosome 8 genomic contig, reference assembly	30.2	56.5	85%	19	100%
gi 51470970 NT_009237.17	Homo sapiens chromosome 11 genomic contig, reference assembly	30.2	478	100%	19	100%

assembly						
gi 89024890 NT_007819.16	Homo sapiens chromosome 7 genomic contig, reference assembly	30.2 243 95%	19	100%	EXHIBIT 5	
gi 88952973 NT_022221.12	Homo sapiens chromosome 2 genomic contig, reference assembly	30.2 56.5 80%	19	100%		
gi 89059027 NT_011520.11	Homo sapiens chromosome 22 genomic contig, reference assembly	30.2 482 100%	19	100%		
gi 37540936 NT_010194.16	Homo sapiens chromosome 15 genomic contig, reference assembly	30.2 432 100%	19	100%		
gi 51475294 NT_011512.10	Homo sapiens chromosome 21 genomic contig, reference assembly	30.2 274 100%	19	100%		
gi 88942921 NT_032977.8	Homo sapiens chromosome 1 genomic contig, reference assembly	30.2 587 100%	19	100%		
gi 51475129 NT_011362.9	Homo sapiens chromosome 20 genomic contig, reference assembly	30.2 137 100%	19	100%		
gi 51493354 NT_010859.14	Homo sapiens chromosome 18 genomic contig, reference assembly	30.2 191 90%	19	100%		
gi 51467897 NT_030059.12	Homo sapiens chromosome 10 genomic contig, reference assembly	30.2 456 95%	19	100%		
gi 157698021 NW_001842414.1	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279188251)	28.2 54.5 80%	73	100%		
gi 157697797 NW_001838459.1	Homo sapiens chromosome 17 genomic contig, alternate assembly (based on HuRef SCAF_1103279188101)	28.2 28.2 66%	73	100%		
gi 157697690 NW_001838289.1	Homo sapiens chromosome 16 genomic contig, alternate assembly (based on HuRef SCAF_1103279188406A)	28.2 28.2 56%	73	100%		
gi 157696440 NW_001838879.1	Homo sapiens chromosome 3 genomic contig, alternate assembly (based on HuRef SCAF_1103279181846)	28.2 28.2 66%	73	100%		
gi 157696476 NW_001838915.1	Homo sapiens chromosome 4 genomic contig, alternate assembly (based on HuRef SCAF_1103279188399)	28.2 135 71%	73	100%		
gi 157812004 NW_001838981.2	Homo sapiens chromosome 6 genomic contig, alternate assembly (based on HuRef SCAF_1103279188350)	28.2 133 85%	73	100%		
gi 157812509 NW_001842412.2	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279188343)	28.2 80.8 95%	73	100%		
gi 157812198 NW_001838073.2	Homo sapiens chromosome 13 genomic contig, alternate assembly (based on HuRef SCAF_1103279188117)	28.2 54.5 66%	73	100%		
gi 157697796 NW_001838458.1		28.2 54.5 76%	73	100%		

Homo sapiens chromosome 17
genomic contig, alternate
USSN10738413 on HuRef
SCAF_1103279188205)

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gi 157696179 NW_001838523.1	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188240)	28.2	54.5	85%	73	100%
gi 157697949 NW_001842359.1	Homo sapiens chromosome X genomic contig, alternate assembly (based on HuRef SCAF_1103279188171A)	28.2	28.2	66%	73	100%
gi 157811991 NW_001838953.2	Homo sapiens chromosome 5 genomic contig, alternate assembly (based on HuRef SCAF_1103279188146)	28.2	159	90%	73	100%
gi 157696949 NW_001838072.1	Homo sapiens chromosome 13 genomic contig, alternate assembly (based on HuRef SCAF_1103279184538)	28.2	28.2	66%	73	100%
gi 157697497 NW_001838219.1	Homo sapiens chromosome 15 genomic contig, alternate assembly (based on HuRef SCAF_1103279188391)	28.2	28.2	66%	73	100%
gi 157811954 NW_001838865.2	Homo sapiens chromosome 2 genomic contig, alternate assembly (based on HuRef SCAF_1103279188138)	28.2	54.5	85%	73	100%
gi 157811766 NW_001838579.2	Homo sapiens chromosome 1 genomic contig, alternate assembly (based on HuRef SCAF_1103279188432)	28.2	212	100%	73	100%
gi 88998470 NT_025741.14	Homo sapiens chromosome 6 genomic contig, reference assembly	28.2	430	100%	73	100%
gi 88972123 NT_037622.5	Homo sapiens chromosome 4 genomic contig, reference assembly	28.2	54.5	66%	73	100%
gi 51464299 NT_022778.15	Homo sapiens chromosome 4 genomic contig, reference assembly	28.2	28.2	66%	73	100%
gi 89060463 NT_011726.13	Homo sapiens chromosome X genomic contig, reference assembly	28.2	80.8	100%	73	100%
gi 51466650 NT_007914.14	Homo sapiens chromosome 7 genomic contig, reference assembly	28.2	139	95%	73	100%
gi 37552371 NT_011255.14	Homo sapiens chromosome 19 genomic contig, reference assembly	28.2	133	80%	73	100%
gi 89059032 NT_011521.4	Homo sapiens chromosome 22 genomic contig, reference assembly	28.2	28.2	66%	73	100%
gi 37551285 NT_034880.3	Homo sapiens chromosome 6 genomic contig, reference assembly	28.2	109	85%	73	100%
gi 88954065 NT_005403.16	Homo sapiens chromosome 2 genomic contig, reference assembly	28.2	454	100%	73	100%

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EXHIBIT 5

 Designing or Testing PCR Primers? Try yours


Alignments

>gi|113722118|ref|NM_000372.4|  Homo sapiens tyrosinase (oculocutaneous albinis
Length=2082

GENE ID: 7299 TYR | tyrosinase (oculocutaneous albinism IA) [Homo sapiens]
(Over 100 PubMed links)

Score = 42.1 bits (21), Expect = 0.005
Identities = 21/21 (100%), Gaps = 0/21 (0%)
Strand=Plus/Plus


Query 1 AATAGGACCTGCCAGTGCTCT 21
Sbjct 338 AATAGGACCTGCCAGTGCTCT 358

>gi|32313592|ref|NM_006418.3|  Homo sapiens olfactomedin 4 (OLFM4), mRNA
Length=2844

GENE ID: 10562 OLFM4 | olfactomedin 4 [Homo sapiens] (10 or fewer PubMed links)

Score = 34.2 bits (17), Expect = 1.2
Identities = 17/17 (100%), Gaps = 0/17 (0%)
Strand=Plus/Plus


Query 5 GGACCTGCCAGTGCTCT 21
Sbjct 242 GGACCTGCCAGTGCTCT 258

>gi|149363684|ref|NM_015325.1|  Homo sapiens KIAA0947 protein (KIAA0947), mRNA
Length=7966

GENE ID: 23379 KIAA0947 | KIAA0947 protein [Homo sapiens]
(10 or fewer PubMed links)

Score = 30.2 bits (15), Expect = 19
Identities = 15/15 (100%), Gaps = 0/15 (0%)
Strand=Plus/Plus

Query 5 GGACCTGCCAGTGCT 19
Sbjct 5584 GGACCTGCCAGTGCT 5598

>gi|142386366|ref|NM_138392.2|  Homo sapiens SH3BP1 binding protein 1 (SH3BP1)
Length=2357

GENE ID: 92799 SH3BP1 | SH3BP1 binding protein 1 [Homo sapiens]
(10 or fewer PubMed links)

Score = 30.2 bits (15), Expect = 19
Identities = 15/15 (100%), Gaps = 0/15 (0%)

Strand=Plus/Minus

Query 5 GGACCTGCCAGTGCT 18
|||||
Sbjct 980 GGACCTGCCAGTGCT 966

US 10/738,413

EXHIBIT 5